

Oracle Academy Database Design Instructor Resource Guide

INSTRUCTOR NOTES

SECTION 4 – Supertypes and Subtypes Lesson

Slide 1: Supertypes and Subtypes

Connections

Review the complete ERD for the DJ business. Point out the subtypes for EMPLOYEE.

Slide 2: What Will I Learn?

No instructor notes for this slide

Slide 3: Why Learn It?

No instructor notes for this slide

Slide 4: Tell Me / Show Me – Evaluating Entities

No instructor notes for this slide

Slide 5: Tell Me / Show Me – Subdivide an Entity

Subtype/ Subentity: Something an entity may be split into based on common attributes and/or relationships

Supertype: A means of classifying an entity that has subtypes

Slide 6: Tell Me / Show Me – Supertype Example

Read the diagram as:

Every QUIZ, MIDTERM, or FINAL is an EXAM

(and thus has attributes such as description, weight, grade, and date).

Conversely:

Every EXAM is either a QUIZ, a MIDTERM, or a FINAL.

Slide 7: Tell Me / Show Me – Always More Than One Subtype

Exhaustive: Treating all parts or aspects without omission.

Mutually exclusive: A relationship that presents choices which are unable to be true at the same time

Slide 8: Tell Me / Show Me – Subtypes Always Exist

No instructor notes for this slide

Slide 9: Tell Me / Show Me – Correctly Identifying Subtypes

No instructor notes for this slide

Slide 10: Tell Me / Show Me – Nested Subtypes

No instructor notes for this slide

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Slide 11: Tell Me / Show Me – Terminology

No instructor notes for this slide

Slide 12: Summary – Objectives Summarized

No instructor notes for this slide

Slide 13: Summary – Practice Guide

No instructor notes for this slide

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SECTION 4 – Documenting Business Rules Lesson

Slide 1: Documenting Business Rules

No instructor notes for this slide

Slide 2: What Will I Learn?- Objectives

No instructor notes for this slide

Slide 3: Why Learn It?- Identify This Business

“Implemented by programming” means that once the database is created, a programmer would write code that would enforce a business rule.

Slide 4: Why Learn It?- Purpose

“Implemented by programming” means that once the database is created, a programmer would write code that would enforce a business rule.

Slide 5: Tell Me / Show Me – Structural and Procedural Business Rules

Business rule: A formalized statement of the usual, customary, or generalized course of action or behavior for a business

Structural business rule: A structural business rule indicates the types of information to be stored and how the information elements interrelate

Procedural business rule: A business rule that is workflow or business process related. (e.g., A has to happen before B, and then C has to happen at the same time as D.) This is also called a process business rule

Slide 6: Tell Me / Show Me – Structural Rule Example

No instructor notes for this slide

Slide 7: Tell Me / Show Me – Rule Discussion

No instructor notes for this slide

Slide 8: Tell Me / Show Me – Procedural Rule Example

Ask students the question:

What procedural business rule is evident from the animation?

Answer:

The project manager first works with the client to confirm the event. Then he assigns an event manager and a DJ to the event.

Discussion:

How do you represent this in the ER diagram? Can you?

Answer:

No, this is a rule that will have to be implemented by a computer program. Visualize a system where the partners can look up events and update them. The program could allow only the project manager to enter a new event and then assign the partners who will be working on it. Once the assignment is made, the system could send out an email

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notification to the event manager and the DJ, giving them details about the event, the customer contact information, etc.

Slide 9: Tell Me / Show Me – Diagram Discussion

Could you represent this in the ERD? **Answer:** No.

How would you implement this with programming? **Answer:** When a student tries to sign up online for the trigonometry class, a piece of code would “check” to see if that student had taken algebra and geometry.

If the student had taken the subjects, can you think of an additional business rule that a school may want in this scenario? **Answer:** Student achieved a passing grade.

Slide 10: Tell Me / Show Me – Documenting Rules

Discussion: Why would you document this? Why would you document anything?

Answers include: What if you leave the project? What if you don’t implement the database? The person who does implement the database will discover that the physical model may not address all the needs of the business because of situations like this!

Important: most procedural rules will be implemented in the physical model by database check constraints, triggers or privileges, or by application code. In the **conceptual** model, the question is: can we draw it in the ERD, or must we document it in words?

Slide 11: Tell Me / Show Me – Terminology

No instructor notes for this slide

Slide 12: Summary – Objectives Summarized

No instructor notes for this slide

Slide 13: Summary – Practice Guide

No instructor notes for this slide

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PRACTICE SOLUTIONS

SECTION 4 – Supertypes and Subtypes Lesson

Vocabulary

Directions: Identify the vocabulary word for each definition below.

<u>Exhaustive</u>	Treating all parts or aspects without omission.
<u>Supertype</u>	A means of classifying an entity that has subtypes.
<u>Subtype/Subentity</u>	Something an entity may be split into based on common attributes and/or relationships.
<u>Mutually exclusive</u>	A relationship that presents choices that are unable to be true at the same time.

Try It / Solve It

1. Identify the supertype and subtype of the entity listed below.

DISABILITY
Visual Impairment
Hearing Impairment
Amputation
Paralysis

Solution:

DISABILITY = supertype
Visual Impairment = subtype
Hearing Impairment = subtype
Amputation = subtype
Paralysis = subtype

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2. For each rule stated indicate if the rule is applicable to supertypes or subtypes.

_____ They have several attributes in common
_____ They inherit all attributes and relationships of the entity
_____ Never exists alone
_____ Create one when a group of instances of an entity have special properties

Solution:

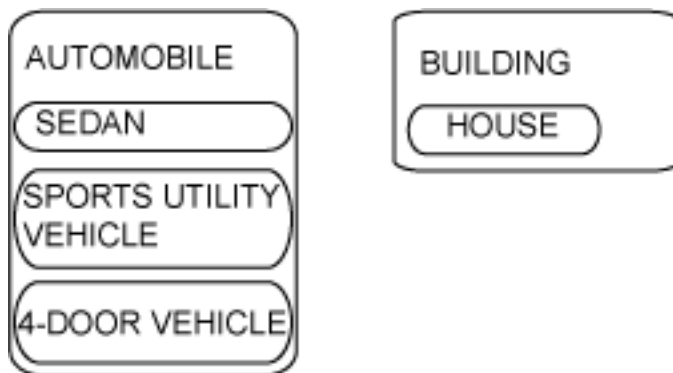
Subtypes
Subtypes
Subtype
Supertype

3. Name three things you consider when considering supertypes and subtypes.

Solution:

- Is this subtype a kind of supertype?
- Have I covered all possible cases? (exhaustive)
- Does the example fit into one and only one subtype? (mutually exclusive)

4. Find the incorrect subtypes in the illustration. Explain why you think the subtype is incorrect. Adjust the model to improve it.



Solution: The subtypes for AUTOMOBILE are not mutually exclusive. A 4-DOOR VEHICLE could also be a SEDAN and/or a SPORT UTILITY VEHICLE. Suggestion for improvement: remove 4-door vehicle subtype. Consider making “number of doors” an attribute of the supertype. Add other nonoverlapping subtypes or an “OTHER” subtype.

The subtypes of BUILDING are not exhaustive. Surely there are other BUILDINGS that are not a HOUSE. Add more subtypes or add an OTHER subtype. Some possible

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subtypes of building are OFFICE, SCHOOL, and FACTORY. Ask students to name other examples of BUILDINGS that could be subtypes.

5. Read the following scenario and construct an ERD that contains at least two subtypes of the entity PRODUCT. Show clearly which attributes belong to the entity supertype, and which belong to one of the subtypes. Identify a UID for the entity.

“Our shops sell several kinds of women’s clothing, including dresses, skirts and blouses. Of course each product has a name, a description and a price. Oh, and sizes too: all products have a waist size. Dresses and skirts have a hem length but blouses don’t. Dresses and blouses have a chest size; skirts don’t.”

Solution: This is tricky because the subtype attributes overlap. For example, hem length is an attribute of two of the three subtypes (two of four if you include an OTHER subtype). Either the hem length can be an attribute of both subtypes DRESS and SKIRT, or hem length can be an attribute of the supertype, with a null value for instances of BLOUSE.

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SECTION 4 – Documenting Business Rules Lesson

Vocabulary

Directions: Identify the vocabulary word for each definition below.

<u>Structural business rule</u>	A structural business rule indicates the types of information to be stored and how the information elements interrelate.
<u>Business rule</u>	A formalized statement of the usual, customary, or generalized course of action or behavior for a business.
<u>Procedural business rule</u>	A business rule that is workflow or business process related. (e.g., A has to happen before B, and then C has to happen at the same time as D.) This is also called a process business rule.

Try It / Solve It

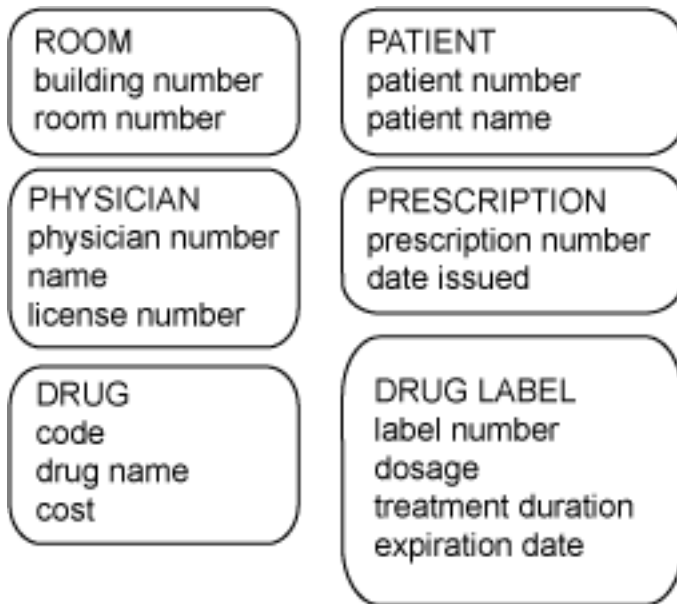
1. Members of your design team have been working with the local hospital to develop a data model for their need to store information about patients, the patient's room number, the patient's doctor, drug prescriptions given, and specific drug information.

However, they all went on vacation and left you to figure out the model. They also failed to give you any of their documentation other than the entities and attributes illustrated here. Instead of going back to the hospital, which could reflect poorly on your company, you're going to have to think about everything you know about hospitals!

Your task is to generate a list of business rules you think were used to arrive at the information shown here. Use your imagination. List 10 structural rules, 5 procedural rules, and 2 programmatic rules (rules to be addressed by computer applications in the future). State each rule as a single sentence.

Based on your set of business rules, draw the ERD.

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Solution:

- **Structural Rules:**

A patient is someone who is admitted to the hospital.
Each room assignment must include the building number and room number.
Each room may be occupied by one or more patients.
A physician must have a valid license number.
Each drug must be prescribed by a physician.
Each drug prescribed must have a label showing label number, dosage, treatment duration, and expiration date.
The drug code, name, and cost must be recorded for all drugs.
Each prescription must have a number and date. Each physician may be assigned to more than one patient. Each patient must have an assigned physician.

- **Procedural Rules:**

Changes to prescriptions can be made only by licensed physicians.
Patients cannot refill prescriptions without a physician's signature.
Physicians cannot remove drug labels.
Patients cannot change hospital rooms without a physician's recommendation.
Nurses cannot reassign patients without physician approval.

- **Programming Rules:**

Drugs costs are billed at current cost at the time of patient discharge.
Physician fees may reflect additional costs associated with patient complications, additional patient requests, etc.

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